

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Grimbergen et al.	Group Art Unit: 1792
Serial No: 09/595,778	Examiner: Allan W. Olsen
Confirmation No: 6490	
Filing Date: June 16, 2000	Attorney Docket No: 002077 USA D01/ETCH/SILICON/MDD
For: APPARATUS AND METHOD FOR MONITORING PROCESSING OF A SUBSTRATE	July 17, 2008 San Francisco, California

DECLARATION PURSUANT TO 37 C.F.R. § 1.131

Box Fee Amendment
Commissioner for Patents
Washington, D.C. 20231

Examiner Olsen:

- I. This declaration is to establish conception of the invention of this application in the United States, at a date prior to December 17, 1996, which is the effective date of U.S. Patent No. 5,985,092 to Chiu et al., and further to establish diligent work on the invention from a date prior to December 17, 1996 and up until the invention was reduced to practice.
- II. The persons making this declaration are the inventors of the present application.
- III. Attached to this Declaration is: Exhibit A, titled "Sensor Program Update", part of a presentation by the inventors which describes aspects of the present invention. Dates have been removed from the document. The presentation was drafted prior to December 17, 1996.

IV. From EXHIBIT A it can be seen that the inventors had conceived of a method of processing a substrate in a process chamber comprising a wall, the method comprising: providing a substrate in the process chamber, the substrate having a surface; introducing a gas into the process chamber; energizing the gas by passing RF energy through the wall of the process chamber to the gas inside the process chamber to energize the gas; detecting radiation reflected from the substrate from directly above the surface of the substrate after the radiation propagates through the wall; and evaluating the detected radiation to monitor the depth of a layer being processed on the substrate, as claimed in claim 1.

V. From Exhibit A it can be further seen that the inventors had conceived of a method of processing a substrate in a process chamber comprising a wall and having a non-vertical multi-turn antenna above the wall, the method comprising: placing in the process chamber, a substrate having a layer; introducing a gas into the process chamber; powering the non-vertical multi-turn antenna to couple energy through the wall to the gas inside the process chamber to energize the gas to process the layer on the substrate; detecting radiation reflected from the substrate and propagating through the wall; and evaluating the detected radiation to monitor the depth of the layer being processed on the substrate, as claimed in claim 105.

VI. Exhibit A also demonstrates that the inventors had conceived of a method of processing a substrate in a process chamber comprising a ceiling and an antenna above the ceiling, the method comprising: providing a substrate in the process chamber, the substrate having a surface; introducing a gas into the process chamber; energizing the gas by applying an RF current to the antenna to pass RF energy through the ceiling of the process chamber to the gas inside the process chamber to energize the gas; detecting radiation reflected from the substrate from directly above the surface of the substrate after the radiation propagates through the ceiling; and evaluating the detected radiation to monitor processing of the substrate, as claimed in claim 106.

VII. Exhibit B is a receipt for a UV photo-sensor used to make a prototype apparatus capable of performing the invention of claims 1, 105 and 106. Date information has been redacted from the receipt. However, the receipt date is prior to December 17, 1996.

IIX. Exhibit C is a receipt for a UV lamp used to make a prototype apparatus capable of performing the invention of claims 1, 105 and 106. Date information has been redacted from the receipt. However, the receipt date is prior to December 17, 1996.

IX. Exhibit D is a receipt for a UV lamp used to make another prototype apparatus capable of performing the invention of claims 1, 105 and 106. Date information has been redacted from the receipt. However, the receipt date is prior to December 17, 1996.

X. Exhibit E is a receipt for a set of UV mirrors to fold the optical beam of a prototype apparatus capable of performing the invention of claims 1, 105 and 106. Date information has been redacted from the receipt. However, the receipt date is prior to December 17, 1996.

XI. From Exhibits B, C, D and E it can be seen that diligent work to reduce the invention of claims 1, 105 and 106 to practice began at a date prior to December 17, 1996.

XII. Exhibit F is an excerpt of a presentation titled "DPS Recess Endpoint Status", dated January 22, 1997. Inventors had completed a UV source assembly prototype, and dome with fused window had been successfully mounted on a chamber system.

XIII. From Exhibit F it can be seen that the invention was diligently worked on in the month of January, 1997.

XIV. The activity evidenced by exhibits B, C, D, E and F was performed in the order listed. At no time was the gap between evidenced adjacent steps greater than a span of two months.

XV. Exhibit G is a photograph showing a working chamber capable of performing the processes of claims 1, 105 and 106. The photograph of Exhibit G was taken with a digital camera and has a file creation date of February 20, 1997.

XVI. Exhibit G shows that the invention was reduced to practice at least as early as February 20, 1997.

XVII. As the person signing below, I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

First Inventor: Michael Grimbergen

Signature: _____

Date: _____

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Redwood City, California 94065

Country of Citizenship: United States of America

Second Inventor: Shaoher X. Pan

Signature: 17-02

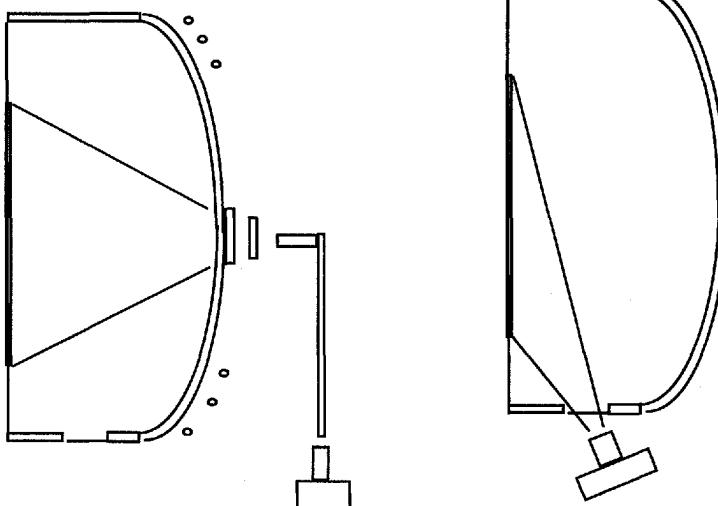
Date: 7/16/2008

Residence: 1133 Kelez Drive
San Jose, California 95120

Country of Citizenship: United States of America

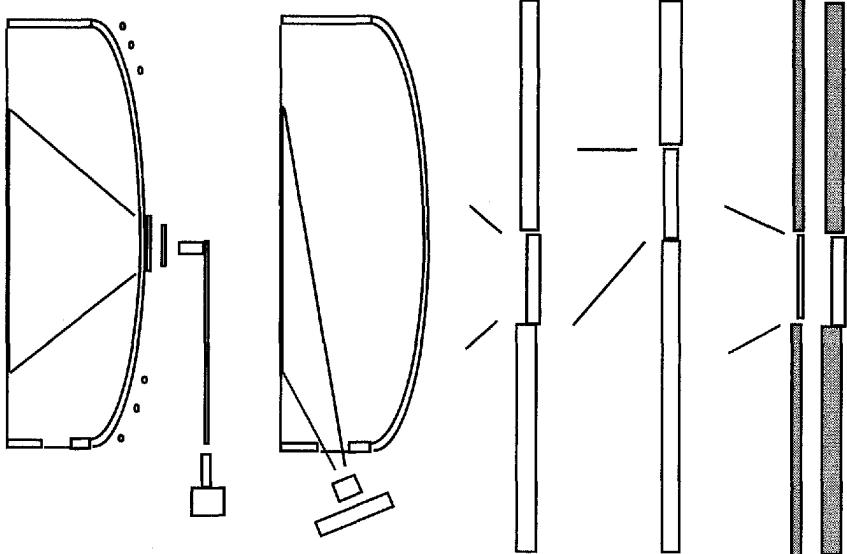
DPS Implementation Plan

- Demonstrated interferometry through side window
 - good image quality
 - topography effect
 - weaker fringe visibility far side of wafer
- Top-down DTCU implementation
 - requires window in ceramic dome
 - limited room for CCD camera
 - image-preserving relay fiber bundle



LES Chamber Integration Options

- **MxP Unilid 21+112 hole GDP**
two windows
- **MxP+ Off-center Sapphire Window**
single window
- **MxP+ Center See-thru SGD**
centered single window
- **DPS side port**
glancing angle
- **DPS top-down**



Recess Etch Endpoint

- **Chamber Hardware:**
 - Lid with window (MxP/Mk II)
 - Dome under development (DPS)
- **Endpoint Hardware:**
 - Monochromatic UV illumination through top of chamber
 - Optical fiber on top of chamber to std. endpoint system
- **Endpoint Software:**
 - ENDP28 Etch-to-depth
 - Calculates etch rate and endpoint to desired depth

DPS Recess Etch Plan

- Fabricate quartz dome with UV FS window fused in center
- Fabricate UV source/fiber detector assembly
- Etch 16 Mb Recess 1 wafer
 - use emission for planarization etch
 - evaluate signal intensity in HDP
 - use modified EP S/W with AGC
- Etch 256 Mb Recess 2 wafer 1.5 um deep
 - evaluate fringe visibility at 254nm
- Redesign prototype
- Modify S/W for early AGC for Recess 2,3

DEC. 2 1996



UDT SENSORS, INC.

12525 Chadron Ave., Hawthorne, CA 90250
 (310) 978-0516 • FAX (310) 644-1727

SOLD TO
 GAGNER-TOOMEY ASSOCIATES
 1680 CIVIC CENTER DRIVE
 SUITE 107
 SANTA CLARA, CA 95050

SHIPPING ORDER No 57782

DATE SHIPPED

CUST P.O.	DEBIT MEMO NO.	M/W NO.
UDT PO	CT LOG NO.	CUSTOMER RET.

ATTENTION: MR. MARK GAGNER

SHIP VIA	OTHER	NO OF PARCS	AMT AL	COMPLT	INSURANCE	PPD	COLLECT	AC NO
UPS APP	UPS	1		X	X	Yes	No	611-70660
ITEM	CITY SHIPPED	UNIT	STOCK NO.	DESCRIPTION			UNIT PRICE	TOTAL
1	1		11-09-006	UDT UV005 (FOP CUSTOMER) APPLIED MATERIALS				

NO CHARGE

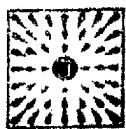
184

PETER C. WILLIAMSON/SALES MANAGER WESTERN REGION

TOTAL FOR CUSTOMS PURPOSES ONLY

White(Packing List) , Blue(Accts) , Green(Shipping) , Canary(Manufacturing) , Pink(Originator) , Gold(Utility) .

INVOICE



Jelight Company, Inc.

2 Mason, Irvine, CA 92718
PHONE: (714) 380-8774 • FAX: (714) 768-9457

INVOICE NO.

18867

INVOICE DATE

1213

PAGE

BILL TO:

SHIP TO:

（注：本表中“新增贷款”指新增人民币贷款，不含外币贷款；“新增存款”指新增人民币存款，不含外币存款。）

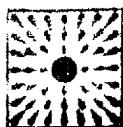
MIKE GRIMBERGEN
APPLIED MATERIALS
767 MARTINIQUE DRIVE
REDWOOD CITY, CA 94065-1339

MISC

CUSTOMER		SHIP VIA		F.O.B.		TERMS	
MISC	JETBLUE	IRVINE, CA				Net 30 Days	
PURCHASE ORDER NUMBER				SALESPERSON		ORDER DATE	OUR ORDER NUMBER
Verbal/Mike		SG					5651
QTY. ORDERED	QTY. SHIPPED BACKORDERED	ITEM NUMBER		UNIT OF MEASURE		UNIT PRICE	EXTENDED PRICE
		ITEM DESCRIPTION				DISCOUNT %	
1	1	82-3309-1		EA		116.25	116.25
	0	LAMP, G.F.D.B.				0.000	Y
<p>THIS IS A REPLACEMENT FOR INVOICE 18026. THE WRONG LAMP WILL BE RETURNED UNDER RMA#1664.</p> <p>SHIP UNDER JELIGHT UPS ACCOUNT.</p>							
<p>NONTAXABLE SUBTOTAL: \$116.25</p> <p>TAXABLE SUBTOTAL: \$116.25</p> <p>TOTAL TAX (8.250%) \$9.39</p> <p>TOTAL: \$125.64</p>							

THANK YOU

INVOICE



Jelight Company, Inc.

2 Mason, Irvine, CA 92718

INVOICE NO.

13472

INVOICE DATE

112

PAGE 1

BILL TO:

SHIP TO:

MIKE GRIMBERGEN
APPLIED MATERIALS
767 MARTINIQUE DRIVE
REDWOOD CITY, CA 94065-1339

MISC

CUSTOMER		SHIP VIA		F.O.B.		TERMS	
NSC	UPSPEED	IRVINE, CA				Net 30 Days	
PURCHASE ORDER NUMBER				SALESPERSON		ORDER DATE	OUR ORDER NUMBER
Verbal		SG					5657
QTY. ORDERED	QTY. SHIPPED BACKORDERED	ITEM NUMBER		UNIT OF MEASURE	UNIT PRICE DISCOUNT %	EXTENDED PRICE	
		ITEM DESCRIPTION				TAX	
1	1	82-3309-1		EA	116.25	116.25	
	0	LAMP, O.F.D.B.			0.000	Y	
<p>THIS IS A REPLACEMENT FOR INVOICE 18067. THE WRONG LAMP WILL BE RETURNED UNDER RMA#1666.</p> <p>SHIP UNDER JELIGHT UPS ACCOUNT.</p>							
<p style="text-align: right;">NONTAXABLE SUBTOTAL: 116.25</p> <p style="text-align: right;">TAXABLE SUBTOTAL: 0.00</p> <p style="text-align: right;">TOTAL TAX (0.250%) 0.00</p> <p style="text-align: right;">TOTAL: 116.25</p>							

THANK YOU

PICKING SHEET

PAGE: 1

REYNARD CORPORATION
1020 CALLE SOMBRA
SAN CLEMENTE, CA. 92673-6227
FAX (714)498-9528
(714) 366-8866

ORDER NUMBER: 0006423
SALESPERSON FRANK SCOTT
DUE DATE
SHIP TO:
MIKE N GRIMBERGEN/CA
767 MARTINIQUE DRIVE

SOLD TO:
MIKE N GRIMBERGEN/CA
BILL TO: VISA CARD #
3903 EXP 6/99
REDWOOD CITY CA 94065
CONFIRM TO: MICHAEL N GRIMBERGEN

REDWOOD CITY CA 94065

CUSTOMER P.O.	SHIP VIA	F.O.B	TERMS
CREDIT CARD	UPS	SAN CLEMENTE, CA	COD

ITEM NO.	UNIT	ORDERED	SHIPPED	BACK ORD
1206	EACH	5.00	5	0
MIRROR: D=12.5 LAMBDA=3 BK7 RH				

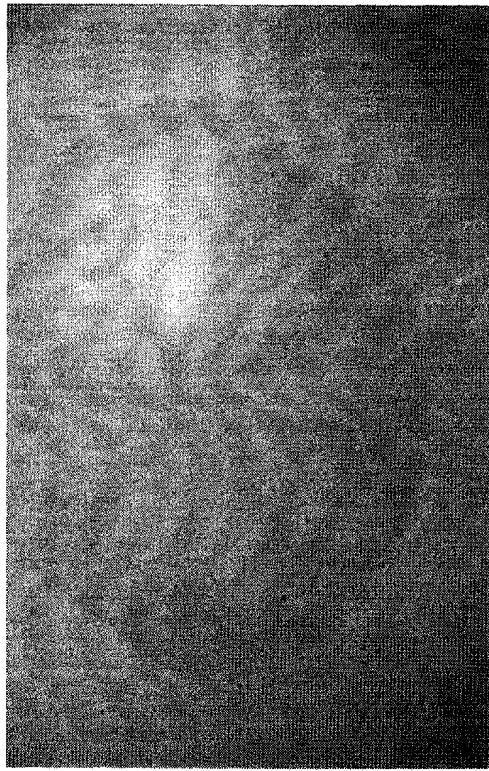
NOTE: COAT WITH -73 ULTRAVIOLET ALUMINUM

Recess Etch Endpoint for DPS

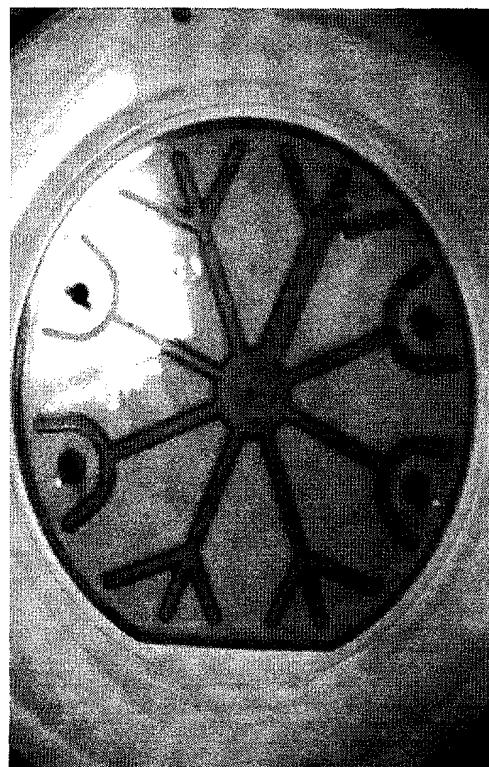
- **Status**
 - UV (254nm) source assembly prototypes completed
 - UV Quartz window fused into quartz dome mounted on EP1
- **Approach**
 - Mount UV source assembly above quartz dome inside unheated dome unit
- **Issues**
 - Limited chamber availability
- **Plan**
 - Demonstrate endpoint hardware feasibility with quartz dome on EP1 chamber
 - Assess demonstrated process on A3 chamber with quartz dome

LES View from Top of Dome

Flame-polished
quartz dome



UV window fused
in quartz dome



6" e-chuck, EP1 - no DTCU
8mm lens, 610nm wavelength

